

In the Claims:

Claims 1 to 20 (Canceled)

1    **21.** (New) Apparatus for the determination of loads on a fiber  
2        composite component (1) of a fiber composite material,  
3        especially of vehicle and aircraft parts, whereby the  
4        component (1) is provided with a prescribable number of  
5        sensor elements (3) for the determination of strains, which  
6        are connected to an evaluating apparatus (4), characterized  
7        in that the sensor elements are embodied as strain gages  
8        (3) and are integrated into the fiber composite  
9        component (1).

1    **22.** (New) Apparatus according to claim 21, characterized by  
2        being embodied as a testing or monitoring apparatus,  
3        whereby a plurality of strain gages (3) are integrated into  
4        the fiber composite component at prescribed spacing  
5        distances, whereby the strain gages detect strains caused  
6        by material stresses at least on damage relevant component  
7        surfaces of the fiber composite component and supply  
8        electrical signals indicating the material stresses to a  
9        central evaluating apparatus (4).

1    **23.** (New) Apparatus according to claim 21, characterized in  
2       that the strain gages are flat foil strain gages, and the  
3       integration of the strain gages (3) is achieved by  
4       laying-in the flat foil strain gages (3) between various  
5       different fiber layers (2) of the fiber composite material.

1    **24.** (New) Apparatus according to claim 23, characterized in  
2       that the integration of the strain gages (3) is carried out  
3       approximately in the middle of the fiber layers (2) in the  
4       area of a neutral fiber of the fiber composite material.

1    **25.** (New) Apparatus according to claim 21, characterized in  
2       that the strain gages (3) comprise measuring grids (5)  
3       covered on both sides with insulating layers (6, 7) of a  
4       carrier material, and whereby connecting points of the  
5       measuring grid (5) are electrically connected with  
6       connecting pins (8) oriented perpendicularly to the  
7       measuring grid (5) and protrude outwardly in an insulated  
8       manner out of one of fiber cover layers (2) of the fiber  
9       composite component.

1    **26.** (New) Apparatus according to claim 25, characterized in  
2       that each one of said connecting pins (8) is connected  
3       above the fiber composite material with a fixed contact  
4       post (21), which lies in contact on an upper fiber layer  
5       (2) of the fiber composite component in an insulating  
6       manner, and serves for the releasable connection with the  
7       evaluating apparatus (4).

1    **27.**   (New) Apparatus according to claim 21, characterized in  
2           that the evaluating apparatus (4) is embodied as an  
3           electronic     computing     apparatus,     which     forms  
4           location-allocated strain values from electrical signals  
5           provided by the various different strain gages (3), whereby  
6           the strain values are proportional to the local component  
7           loading.

1    **28.**   (New) Apparatus according to claim 27, characterized in  
2           that the evaluating apparatus (4) is embodied as a load  
3           monitoring apparatus which forms location-allocated strain  
4           values from the electrical signals of the various different  
5           strain     gages     (3),     whereby     the     strain     values     are  
6           proportional to the local component loading and are stored  
7           by the evaluating apparatus (4).

1    **29.**   (New) Apparatus according to claim 27, characterized in  
2           that the evaluating apparatus (4) is embodied as a  
3           monitoring apparatus, which compares the location-dependent  
4           strain values with construction-necessitated load limit  
5           values, and displays or signals a damage danger or a damage  
6           upon exceeding of one or more limit values.

1    **30.**   (New) Apparatus according to claim 27, characterized in  
2           that the evaluating apparatus (4) is embodied as a testing  
3           apparatus, which couples the applied component loadings  
4           with location-allocated strain values, and from that forms

5 a loading or tension analysis of the tested fiber composite  
6 component.

1 31. (New) Apparatus according to claim 27, characterized in  
2 that the evaluating apparatus (4) is equipped with a  
3 processor (23), which evaluates the electrical signals of  
4 the strain gages (3) with respect to various different  
5 criteria, such as probability or prevalence distribution,  
6 polarity and time sequence.

1 32. (New) Apparatus according to claim 27, characterized in  
2 that the evaluating apparatus (4) consists of an  
3 electrically shielded housing (24), an electrical current  
4 supply (25), an amplifier unit (26), a processor (22), an  
5 internal timer (23) and a data memory apparatus (27).

1 33. (New) Apparatus according to claim 27, further comprising  
2 connecting pins (8) that are connected to the strain gages  
3 and that are used at each measuring location for the  
4 securing of an electrical apparatus for the measuring  
5 location identification (28) and are circuit-connected  
6 before the evaluating apparatus (4).

1 34. (New) Method for the production of an apparatus according  
2 to claim 21, characterized in that at least one or more  
3 fiber layers (2) are laid into a prescribed mold (15) and  
4 are provided with a polymeric material, and following that,  
5 several flat foil strain gages (3) with measuring grids

(5), and connecting pins (8) oriented perpendicularly thereon, are placed on the one or more fiber layers at provided component locations, which foil strain gages and connecting pins are covered with at least one further layer (2), out of which the connecting pins (8) protrude outwardly above the fiber cover layer (2) and are pressed to form a solid or rigid fiber composite component (1) with integrated strain gages (3).

35. (New) Method according to claim 34, characterized in that the fiber composite component (1) is produced by means of vacuum or pressure process, whereby a stamping die (21) of soft porous material is arranged above a peel-off film (16), which stamping die receives the outwardly protruding connecting pins (8), and which is again removed after the production process.

36. (New) Sensor element for the determination of strains in fiber composite components (1), which comprises a foil strain gage (3) with a measuring grid (5). a carrier layer (6), an upper cover layer (7), and connecting pins (8) arranged perpendicularly to the measuring grid (5) and serving as electrical connection points, and wherein the upper cover layer (7) of the foil strain gage (3) is embodied like the carrier layer (6) thereof.

37. (New) Sensor element according to claim 36, characterized in that a strain relief (10) of measuring grid material is

provided between end points of the measuring grid (5) and the connecting pins (8), wherein the strain relief prevents a measured value falsifying resistance influence of supply lines in connection with large material strains in the fiber composite material.

38. (New) Sensor element according to claim 36, characterized in that the outer surfaces of the carrier layer (6) and of the cover layer (7) are irradiated for roughening, and thereby serve for the improvement of the adhesion forces to the fiber layers (2).

39. (New) Sensor element according to claim 36, characterized in that the strain gages (3) are embodied as longitudinally oriented measuring grids (5) or as rosettes.

40. (New) Sensor element according to claim 36, characterized in that the connecting pins (8) are surrounded by an insulating layer (20), which is easily removable for the coupling to an evaluating apparatus (4), and whereby the connecting pins (8) comprise a length of 5 to 50 mm and a diameter of approximately 0.5 to 2 mm.

**[REMARKS FOLLOW ON NEXT PAGE]**